



# Glenlofty Creek Waterway Action Plan



December 2002

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# Introduction

This Waterway Action Plan for Glenlofty Creek has been prepared by Earth Tech Engineering for the Wimmera Catchment Management Authority.

The Wimmera Catchment Management Authority plans to undertake a stream management works program along the Glenlofty Creek, which has been identified as a high priority for management. This Waterway Action Plan has been completed to help facilitate the implementation of the waterway management works. The development of local community support, the investigation of reach wide issues and the subsequent provision of a technical and financial basis for the works to government, are important aspects of this Action Plan.

This report includes a discussion of stream processes, habitat, riparian vegetation, stream flow and water quality issues and establishes a technical basis for determining the priorities for works implementation. In determining these priorities the investigation also considers the objectives of the Wimmera Catchment Management Authority via objectives referenced in the relevant regional strategies.

Once these priorities have been set, the works program will be developed in consultation with the local community. Individual works sites will be assessed in the field against the priorities set for the program and associated financial considerations.



## **Regional Objectives**

The regional strategies and policies which are relevant to the Wimmera River Catchment are the:

- Victorian River Health Strategy (2002)
- Draft Wimmera Waterway Management Strategy (2002)
- Wimmera Water Quality Strategy (2002)
- Wimmera River Geomorphic Investigation (2002)

### **Review of Regional Strategies**

### The Victorian River Health Strategy

The objective of the Victorian River Health Strategy (VRHS) is to achieve healthy rivers, streams and floodplains which meet the environmental, economic, recreational and cultural needs of current and future generations (DNRE, 2002). This goal is to be attained using the following four key elements of the strategy (DNRE, 2002):

- Protecting rivers that are of the highest community value from any decline in condition;
- Maintaining the condition of ecologically healthy rivers;
- Achieving an 'overall improvement' in the environmental condition of the remainder of rivers, and;
- Preventing damage from future activities.

Implementation of this management approach will be by:

- Providing special protection for rivers of very high value;
- Establishing regional five and 10 year targets for river protection and restoration through community-driven regional planning processes; and
- Establishing policies for specific management activities aimed at preventing damage to river health from future management activities.

Regional River Health Strategies, of which this report is a part, aim to:

- Identify environmental, recreational, social and economic assets;
- Identify threats to assets;
- Set broad priorities for protection and restoration based on a risk-based approach and a level of community commitment;
- Identify broad actions required;

- Include detailed issue specific action plans which identify:
  - Detailed options for actions and analyse these using the cost-benefit approach;
  - Priority actions;
  - Roles and responsibilities;
  - The cost sharing arrangements;
  - o Timetable for implementation; and
  - Five year implementation targets and 10 year resource condition targets;
- Integrate five year implementation targets and 10 year resource condition targets for major river reaches;
- Set integrated river health objectives and targets for major river reaches; and
- Include monitoring, reporting and review programs.

The VRHS goes on to briefly describe some of the details of managing:

- Water quality;
- Riparian lands; and
- River channels.

### The Wimmera Waterway Management Strategy

The Wimmera Waterway Management Strategy (WWMS) aims to provide direction for waterway management within the Wimmera region (Sinclair Knight Merz 1999). The goal of the strategy is to, "protect and enhance the region's waterways through fair and sustainable management, taking account of environmental, economic, cultural and social objectives. In 1997 the Wimmera Regional Catchment Strategy recognised the need to develop and implement an integrated waterway management program for the two river basins within the Wimmera CMA region. A series of programs, which are consistent with the Wimmera Regional Catchment Strategy, are detailed in the WWMS. Of particular relevance to this Waterway Action Plan are:

- Program 1. Asset Management, the aim of which is to manage structural waterway assets so as to improve the health of the waterways;
- Program 2. Waterway Repair and Maintenance, the aim of which is to preserve, maintain and/or rehabilitate the environmental, economic and social values of waterways;
- Program 3. Riparian Management, the aim of which is to improve waterway health through the sustainable management of riparian zones; and
- Program 4. Catchment Management, the aim of which is to assist in addressing land management issues that have negative impacts on waterway values.

Appendix A of the WWMS describes the method used to divide the Wimmera CMA into 12 Waterway Management Units (WMU). Detailed information on each river reach which makes up a WMU has been gathered through literature reviews and field inspections. Tables summarizing the stability, ecological condition and estimated cost of works required for each reach are provided.



This report aims to confirm and elaborate on the findings of the WWMS in relation to Glenlofty Creek as defined in the Wimmera River Geomorphic Investigation.

### The Wimmera Water Quality Strategy

"The aim of the Wimmera River Water Quality Strategy is to improve the quality of the Region's water that will result in environmental, social and economic benefits to the Region." Poor water quality has resulted in a significant number of blue green algae blooms in the past. Implementing the strategy could reduce total phosphorous levels in the Wimmera River by up to 42 tonnes per year (WCMA 2002).

The strategy is to be applied through a number of Programs. Of these, Program 7; Catchment and River Health Management, is most relevant to this report. Its objective is to, "ensure that catchment and river health management in the region will result in improved water quality". This is to be achieved through:

- Waterway repair and maintenance;
- Flow regimes;
- Riparian management; and
- Catchment management

It has been estimated that catchment wide implementation of these strategies could reduce total phosphorous input to the catchment by 24.1 tonnes per year.

#### The Wimmera River Geomorphic Investigation

The Wimmera River Geomorphic Investigation (WRGI) comprises a review and analysis of sediment processes within the Wimmera catchment, with a focus primarily on the Wimmera River. This report recommends that the following priorities, based on the principles of best practice catchment management, be applied:

- Preserve areas with near pristine values;
- Restore areas of high value;
- Rehabilitate areas that place other values at risk or provide good opportunity for restoring values; and
- Maintain degraded areas to prevent values declining to unacceptable levels.

Broadly examining the upper catchment areas, the Geomorphic Investigation found that some streams and tributaries are delivering high sediment loads to the Wimmera River. This excess sediment is threatening reaches harbouring rare geomorphic and ecological features. In particular the report found that Reaches 2, 4 and 6 are high priorities for management intervention. With regard to Glenlofty Creek the WRGI (ID&A 2002) notes that, *"Glenlofty Creek, a near intact Chain of Ponds type stream, represents a rare geomorphological feature in this region and across most of Australia. This stream provides the WCMA with the opportunity to preserve (with implementation of some minor vegetation and ecological rehabilitation) a near intact chain of ponds"." Management efforts should be focussed on ecological attributes of the stream on a reach wide basis. Geomorphic processes will largely be managed by rehabilitation of riparian vegetation, it is expected that only localised bank erosion incidences may require structural works to complement vegetation".* 

### **Summary of Strategies**

Table 1 summarises this review of strategies which guide and contribute to the Waterway Action Plan for Glenlofty creek. The figure on the following page illustrates the relationship between these reports and the Waterway Action Plans.

Report	Strategy Scale	Relevant Aims
Draft Victorian River Health Strategy 2002	State Wide	<ul> <li>Protect rivers that are of the highest community value from any decline in condition;</li> <li>Maintain the condition of ecologically healthy rivers</li> <li>Achieve an overall improvement in the environmental condition of the remainder of rivers;</li> <li>Prevent damage from future activities.</li> </ul>
The Wimmera Waterway Management Strategy	Regional	<ul> <li>Manage structural assets to improve waterway health;</li> <li>Preserve, maintain and/or rehabilitate the environmental, economic and social values of waterways;</li> <li>Manage riparian zones to improve waterway health;</li> <li>Address land management issues that have negative impacts on waterway values</li> </ul>
The Wimmera Water Quality Strategy	Catchment Wide	<ul> <li>Ensure catchment and river health management in the region will result in improved water quality, through:</li> <li>Waterway repair and maintenance</li> <li>Improved flow regimes</li> <li>Riparian management</li> <li>Catchment management</li> </ul>
The Wimmera River Geomorphic Investigation	Catchment Wide	<ul> <li>Preserve areas with near pristine values</li> <li>Restore areas with high values</li> <li>Rehabilitate areas that place other values at risk or provide good opportunity for restoring values</li> <li>Maintain degraded areas to prevent values declining to unacceptable levels</li> </ul>
Waterway Action Plan for Glenlofty Creek	River Reach Specific	<ul> <li>Preserve, maintain and/or rehabilitate the environmental, economic and social values of waterways</li> <li>Manage riparian zones to improve waterway health</li> <li>Address land management issues that have negative impacts on waterway values</li> </ul>

#### Table 1 Summary of relevant strategies



### Relationships between reports used to compile the Waterway Action Plan for Glenlofty Creek



### **Glenlofty Creek Waterway Action Plan**

The Glenlofty Creek represents an uncommon geomorphological feature in the Wimmera region being, for the majority of its length, a near intact Chain of Ponds. For this reason Glenlofty Creek is assigned as a high priority sub catchment within the Wimmera region

Unlike other waterway action plans in the Wimmera, the focus in Glenlofty Creek is predominantly on maintaining and enhancing the unique values of the Chain of Ponds system and less so on managing sediment which may threaten high value downstream reaches of the Wimmera River.

### **Overview of Glenlofty Creek**

The Glenlofty Creek is a predominantly south flowing tributary of the Wimmera River The creek enters the river approximately 4 kilometres downstream of Elmhurst.

The catchment of the Glenlofty Creek is dominated by State Forest particularly in the upper reaches. Outside of the state forest the land use is predominantly grazing with small areas of vineyard and cropping. Minor streams and creeks within forested sections of the catchment are believed to be stable. Forest use is predominantly firewood and small wood (poles, posts) recovery.

For the majority of its length Glenlofty Creek is a near intact chain of ponds. The very downstream extent of the creek is a continuous partly confined channel (WRGI, 2001). The Chain of Ponds has not been subject to contemporary incision processes as the Wimmera River, which acts as a downstream control, has been relatively insensitive to change. Further there appears to have been no deliberate attempts as yet to drain Glenlofty Creek.

The Glenlofty Creek catchment is shown in Figure 1 on the following page.





### Identification of Significant Stream Health Conditions and Threats for Glenlofty Creek

The following describes significant stream health conditions, threats and opportunities associated with the Geomorphic, Vegetation, Habitat and Water Quality aspects of Glenlofty Creek.

### Geomorphology

The geomorphic condition of Glenlofty Creek has been graded as good. The Chain of Ponds within sub reach 4 is graded as excellent while bed and banks generally throughout the creek are stable. High value sections have benefited from low stocking rates and few attempts to channelise the stream. Stock access does pose a threat throughout the stream. Stock control through fencing and revegetation, if appropriate, would be the most effective means of protecting against instabilities.

### Vegetation

Overstorey riparian vegetation is rated as poor - medium along the length of the Glenlofty Creek. Understorey vegetation, particularly grasses sedges and rushes, is extensive and healthy stands of instream vegetation exist throughout the creek. Willows and poplars occur commonly, particularly in the lower sections. Spiny rush occurs in isolated patches in the lower sections.

Where fencing has occurred along the creek, there are excellent examples of deep pools surrounded by dense overstorey and understorey vegetation. The pools also contain large amounts of large woody debris. The greatest risks to improvement and maintenance of a healthy native riparian zone are uncontrolled stock access and the spread of willows and poplars. There are also opportunities for the management of spiny rush.

### In Stream Habitat

Moving downstream, the instream habitat within Glenlofty Creek grades from poor to excellent. The upper reaches of the creek are generally poor with little overstorey. A lack of overstorey has resulted in little to no large woody debris instream. The chain of ponds systems are surrounded in many instances by extensive stands of phragmites, sedges and rushes.

In stream habitat values within Glenlofty Creek are difficult to determine. There is little knowledge of the habitat values of chains of ponds. An extensive understorey offers shelter and food for birds, amphibians and macroinvertebrates. Small native fish species such as River Blackfish, Mountain galaxias, southern pygmy perch and flat - headed gudgeon are known to occur in the upper Wimmera River system. River Blackfish within the Wimmera are known to be "spatially isolated from other Victorian populations and as such may be genetically distinct and of conservation significance" (NRE 2001). Platypus have also been recorded in the upper Wimmera River. Glenlofty Creek may offer suitable platypus habitat.

The biggest threat to instream habitat is stock access and lack of woody debris. The most effective method to address these threats is through managing stock access and revegetating with overstorey species. Fencing should be the primary focus as it directly reduces the impact of stock and allows the natural regeneration of vegetation.

### Water Quality

Water Quality varies markedly over the length of the Glenlofty Creek. The upper and lower sections of the creek have good to moderate water quality whilst the middle sections of the creek are rated as poor. Localised water quality issues exist where stock have direct access to the Creek. In some instances the creek bed has been incised by landholders creating pools for stock watering. The presence of spiny rush indicates that salt may be present. The potential threat to the Chain of Ponds from salt intrusions should be investigated. Bulk nutrient inputs from leaf fall and deoxygenation are major issues associated with exotic species such as willows and poplars.

### **Management Reaches**

For the purpose of developing the WAP Works Program, Glenlofty Creek has been divided into 6 sub-reaches. The location of each sub-reach has been determined by a field inspection and visual assessment of the geomorphic, vegetation, instream habitat and water quality conditions along the length of Glenlofty Creek

### Sub reach 1

The sub reach contains the Glenlofty Creek above GPS grid coordinates E 699 571, N 5 894 755. It is mostly State Forest with a small section of private property. The reach boundary is defined by a fence running across the creek at the above coordinates. Regrowth forest extends from the State Forest into the private property. The upstream section of the creek extends into the Pyrenees State Forest.



Figure 2. Looking upstream into forested area at the downstream end of Sub-reach .1

### **Current Status**

The creek is stable throughout the sub reach with no sediment contributed from upstream. Within the State Forest there are no signs of instability.

Overstorey riparian vegetation outside of forested areas is rated as poor consisting predominantly of individual trees and small clumps. There is a good coverage of understorey particularly rushes, grasses and bracken within the riparian zone, Within private property there is light grazing by cattle which may threaten bed and bank stability and vegetation cover, if overgrazed.

The in stream habitat is rated as moderate which reflects the swampy nature of the creek outside of the forested areas. Habitat values in this section of the creek would be improved by the provision of an overstorey which would provide shelter and shading to reduce the rate of drying of the creek.

Due to its stable nature and the presence of a well vegetated understorey, water quality is rated as good.

GPS grid coordinates for the start and end of the reach are E 699 571, N5 894 755 to E 698 916, N 5 893 462. The downstream reach delimiter is a change in the form of the creek to a confined valley (adjacent to Williamson Road).



Figure 3. Looking downstream from the upstream end of Sub-reach 2.

### **Current Status**

The creek within this reach has localised instabilities which appear to be associated with stock accessing pools.

Overstorey riparian vegetation is rated as poor consisting predominantly of individual trees and small clumps. There is an extensive coverage of understorey, particularly rushes, sedges and grasses.

The in stream habitat is rated as poor. The creek is predominantly swampy in nature although pools are appearing within this sub reach. The sub reach is grazed and as a result stock are significantly impacting on pools through reduced vegetative cover and bank disturbance. Habitat values in this section of the creek would be improved by the provision of overstorey, as per sub reach 1, and stock control.

As with in stream habitat, water quality is greatly impacted upon by grazing. Overall water quality is rated as moderate.

GPS grid coordinates for the start and end of the reach are E 698 916, N 5 893 462 to E 697 546, N 5 891 982. The sub reach is defined by the section of Glenlofty Creek within a confined valley



Figure 4. Crack Willows and stock damage to stream banks in Sub-reach 3.

### **Current Status**

Bed and banks within this sub reach are moderately stable. Bank instability occurs in localised areas associated with stock access. The stream is characteristically channelised without the large areas of grasses, sedges and rushes which occur in upstream sections.

Overstorey riparian vegetation is poor. The sub reach contains scattered weeping and crack willow with scattered clumps of native vegetation. Understorey is less swampy in nature than upstream reaches and consists predominantly of grasses with clumps of rushes.

In stream habitat is rated as poor. Grazing has reduced groundcover along stream beds and trampling by stock has damaged stream banks.

Water quality is rated as poor to moderate due to grazing impacts, bulk nutrient inputs and deoxygenation associated with leaf drop by exotic trees.

GPS grid coordinates for the start and end of the reach are E 698 916, N 5 893 462 to E 695 970, N 5 890 163. The downstream reach delimiter is the Glenlofty – Warrenmang Road.



Figure 5. Chain of ponds formation at the downstream end of Sub-reach 4

### **Current Status**

The creek within this reach is currently stable. There is isolated erosion as a result of grazing which has the potential to initiate erosion heads.

Overstorey riparian vegetation is limited to individual trees and small clumps of trees. The understorey coverage is extensive with large occurrences of grass and phragmites. Willows and other exotics occur regularly within the reach. Overgrazing does pose a threat to the vegetation.

As with upstream sub reaches, in stream habitat is compromised due to little or no overstorey cover. Extensive grass and reed areas particularly around pools provide good habitat for amphibians, small birds and macroinvertebrates.

The greatest impact upon water quality appears to be grazing. There is the potential for further impact on water quality due to runoff from the vineyard in the lower section of the reach. Decreasing water quality from overland flows is less of an issue where there is extensive grass cover.



GPS grid coordinates for the start and end of the reach are E 695 970, N 5 890 163 to E 694 799 N 5 888 446. The downstream reach delimiter is the crossing on Boatman's Road.



Figure 6. Stable pools flanked by Phragmites and sedges in Sub-reach 5.

### **Current Status**

The creek within sub reach 5 is rated as stable. The channel is continuous in most parts. The creek contains many pools which are flanked by phragmites and sedges. Grazing may present a risk

Overstorey riparian vegetation is more extensive than upstream sub reaches. There are good stands of blackwood. Willows and poplars occur often along the creek. Stands of spiny rush indicate that salinity may be an issue in this sub reach.

In stream habitat is rated as good. Pools are commonly long and deep and expected to support fish species. Habitat is restricted by the absence of overstorey species which would provide shade and shelter.

Water quality is rated as good. Extensive grassed areas provide good filtration. Stock have access in isolated locations and this may reduce water quality values. Salinity may be an issue and further investigation is recommended.

GPS grid coordinates for the start and end of the reach are E 694 799, N 5 885 282 to E 698 877, N 5 885 282. The downstream reach delimiter is the confluence of Glenlofty Creek with the Wimmera River



Figure 7. An example of a stable incised channel, often containing large woody debris, in Sub-reach 6 of Glenlofty Creek.

### **Current Status**

The creek within this reach is a stable incised channel. There are pool riffle sequences containing large woody debris. Localised erosion occurs where trees have fallen into the creek and there are localised instabilities where stock have access. There is an eroding tributary containing a small erosion head contributing sediment into the reach at E 694 850, N 5 886 200. Immediately downstream of the tributary there are several pools, which have been fenced, and which are in very good condition.

Overstorey riparian vegetation is rated as moderate. There are more continuous ribbons of native overstorey vegetation although willows and other exotics are present. The understorey is dominated by phalaris with isolated occurrences of native grasses.

An in stream habitat rating of very good reflects the occurrence of large woody debris, pool and riffle sequences and significant shading provided by overstorey vegetation.

Water quality is rated as moderate to good, reflecting the values listed above. Some sections of the sub reach are also fenced, and therefore there is significantly less impact from stock.



### Summary of Stream Health Conditions

The following table is a summary of stream health condition in each of the six subreaches of Glenlofty Creek:

Sub Reach	Geomorphology	Vegetation	Instream Habitat	Water quality
1	Good	Poor	Poor	Good
2	Satisfactory	Poor	Poor	Satisfactory
3	Satisfactory	Poor	Poor	Poor
4	Excellent	Satisfactory	Satisfactory	Poor
5	Good	Satisfactory	Good	Good
6	Good	Satisfactory	Excellent	Satisfactory

Table2: Summary of Stream Health Conditions

## **Proposed Program of Activities for Glenlofty Creek**

### General

Chains of ponds systems within south eastern Australia are uncommon and there is limited understanding of such stream types. Plowman (2001) notes that "The number of technical papers and reports on the Australian fluvial chain of ponds systems is limited. There is almost no description of formation processes associated with chains of ponds or mention of their hydraulic processes or longitudinal distribution within the system". Glenlofty Creek is the only chain of ponds system recognised within the Wimmera CMA region. As an intact system, it offers the unique opportunity to record and monitor the ecological values of this stream type.

Management objectives, actions and landholder details are shown for each of the six sub-reaches below. Landholder property boundaries are shown diagrammatically in Appendix A.

### **Recommended actions:**

Undertake a research program to

- Determine the hydrological regime of the system
- · Determine in stream ecological associations
- Develop a monitoring program to measure the geomorphic and ecological health of the chain of ponds system

### Sub reach 1

### Management Objectives

- To reduce impact of stock on ecological values of the stream.
- · Protect geomorphological character of stream
- Enhance riparian zone of stream

### Recommended actions:

- Restrict stock access through fencing
- Revegetate the riparian zone with overstorey species
- Extend the riparian zone, from the existing native forest, by revegetation
- · Monitor the sub reach for sediment inputs from the State Forest

### **Priority: Low**

Name	Dept. Natural Resources & Environment	Name	Phillip Cocking
Address	Maryborough	Phone Number	03 5466 2260
Phone Number	(03) 5461 0800		



### Management Objectives

- Protect geomorphological character of stream
- Reduce grazing impacts on pools
- Enhance the riparian zone of the stream
- Enhance in stream habitat of pools

### Recommended actions:

- Restrict stock access, particularly to pools
- Provide off stream watering if appropriate
- Revegetate with overstorey species particularly around pools

### **Priority: Low**

Name	Phillip Cocking
Phone Number	(03) 5466 2260

### Management Objectives

- To protect and enhance the ecological values of the stream.
- Reduce grazing impacts
- Reduce the threat and spread of exotics
- Protect the geomorphological character of the stream
- Enhance the riparian zone of the stream
- Enhance in stream habitat of pools

### Recommended actions:

- Restrict stock access
- Provide off stream watering if appropriate
- Revegetate with overstorey species
- Remove willows and other exotics

### **Priority: Low**

Name	Phillip Cocking
Phone Number	(03) 5466 2260



### Management Objectives

- To protect and enhance the ecological values of the stream.
- Protect the geomorphological character of the stream
- Reduce grazing impacts on pools
- Enhance riparian zone of stream
- Enhance in stream habitat of pools

### Recommended actions:

- Restrict stock access, particularly to pools
- Provide off stream watering if appropriate
- Revegetate with overstorey species

### **Priority: High**

Name	Phillip Cocking
Phone Number	(03) 5466 2260
Namo	Ion McNoil

Name	Ian McNell
	Southcorp Wines
Phone Number	(03) 5354 8334

### Management Objectives

- To protect and enhance the ecological values of the stream.
- Reduce grazing impacts on pools
- Determine the impact of salinity on ecological values of the stream
- · Reduce the threat and spread of exotics
- Protect the geomorphological character of the stream
- Enhance the riparian zone of the stream
- Enhance in stream habitat of pools

#### **Recommended actions:**

- Restrict stock access, particularly to pools
- Provide off stream watering if appropriate
- Revegetate with overstorey species
- · Monitor salinity levels within the reach to determine potential impacts
- Remove willows and exotics

### **Priority: Medium**

Name	Ron Croft
Phone Number	(03) 5354 8242

Name	Doug Boatman
Phone Number	(03) 5354 8215



### Management Objectives

- To protect and enhance the ecological values of the stream.
- Reduce grazing impacts
- Reduce threat and spread of exotics
- Protect the geomorphological character of the stream
- Enhance the riparian zone of the stream
- Enhance in stream habitat of pools

### Recommended actions:

- Stabilise the eroding tributary
- Restrict stock access
- Remove willows and other pest species
- Provide off stream watering if appropriate
- · Revegetate with overstorey species
- Fence and revegetate the eroding tributary

### Priority: Medium

Name	Ron Croft
Phone Number	(03) 5354 8242

Name	Doug Boatman
Phone Number	(03) 5354 8215

Name	Steve Fisher

Phone	Number	(03) 5354 8204
	Humbol	(00) 000 1 020 1

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# Appendix A: Glenlofty Creek Landholder Property Boundaries

